

Bromacil

HERBICIDE FACT SHEET

U.S. DEPARTMENT OF ENERGY
BONNEVILLE POWER ADMINISTRATION

This fact sheet is one of a series issued by the Bonneville Power Administration for their workers and the general public. It provides information on forest and land management uses, environmental and human health effects, and safety precautions. A list of definitions is included in Section VIII of this fact sheet.

I. BASIC INFORMATION

COMMON NAME: bromacil*

CHEMICAL NAME: 5-bromo-3-sec-butyl-6-methyluracil, CAS No. 314-40-9
5-bromo-3-sec-butyl-6-methyluracil, lithium salt, CAS No. 53404-19-6

* According to EPA, bromacil and bromacil lithium salt are toxicologically similar. This Fact Sheet applies to both active ingredients.

CHEMICAL TYPE: uracil class of herbicide

PESTICIDE CLASSIFICATION: systemic, broad-spectrum herbicide to controls weeds and brush

REGISTERED USE STATUS: General Use Pesticide. Restricted Use Pesticide in Washington.

FORMULATIONS: Commercial herbicide products generally contain one or more ingredients. An inert ingredient is anything added to the product other than an active ingredient. Because of concern for human health and the environment, EPA announced its policy on toxic inert ingredients in the Federal Register on April 22, 1987 (52FR13305). This policy focuses on the regulation of inert ingredients. EPA's strategy for implementing this policy included the development of four lists of inerts, based on toxicological concerns. Inerts of toxicological concern were placed on List 1. Potentially toxic inerts/high priority for testing were placed on List 2. Inerts of unknown toxicity were placed on List 3, and inerts of minimal concern were placed on List 4.

The inert ingredients of the dicamba formulations are not classified by the USEPA as inert ingredients of toxicological concerns to humans or the environment.

The contents of the bromacil formulation is listed below:

Hyvar™ X (Wettable Powder)		Hyvar™ X-L (Water Soluble Liquid)	
Bromacil	80 %	Bromacil Lithium Salt	21.9 %
Inert	20 %	Inert	78.1 %

RESIDUE ANALYTICAL METHODS: EPA Method 632

II. HERBICIDE USES

REGISTERED FORESTRY, RANGELAND AND RIGHT-OF-WAY USES: Bromacil as Hyvar™ is registered for use in non-agricultural and agricultural areas for the control of weeds, grasses, and as a total vegetation management tool for bare-ground treatment. For terrestrial use only.

OPERATIONAL DETAILS:

TARGET PLANTS: Bromacil is a non-selective herbicide for annual and perennial weeds and brush, woody plants and, vines.

MODE OF ACTION: Bromacil enters the plant through the root zone and moves throughout the plant inhibiting photosynthesis.

METHOD OF APPLICATION AND RATES: Broadcast, band and basal application at 2 to 12 pounds of formulated product per acre. Aerial application is prohibited.

SPECIAL PRECAUTIONS:

TIMING OF APPLICATION: For woody plants and brush, Bromacil is applied in the spring and summer. As bromacil must move to the root zone to be effective, adequate soil moisture is necessary.

DRIFT CONTROL: Care should be exercised not to overspray or apply the herbicide to adjacent non-target areas. Drift control is achieved by observing weather conditions and following label and sprayer instructions. Spray droplet size should be 150 microns or larger.

RESTRICTIONS/WARNINGS/LIMITATIONS: Do not enter or allow others to enter the treated area until sprays have dried. Not for use in recreation or residential areas. Do not apply through any type of irrigation system. Do not apply more than 12 pounds/acre/year for any treated site. Do not apply when ground is frozen. Do not apply directly to water or areas where surface water is present, or to intertidal areas below the mean high water mark. Do not apply to irrigation banks or other ditch banks. Do not graze animals in treated areas. Will harm non-target plants.

III. ENVIRONMENTAL EFFECTS/FATE

SOIL:

RESIDUAL SOIL ACTIVITY: The half-life of bromacil is 275 days.

ADSORPTION: The K(oc) of bromacil is 32.

PERSISTENCE AND AGENTS OF DEGRADATION: Bromacil is persistent with no major (>10%) degradates.

METABOLITES/DEGRADATION PRODUCTS AND POTENTIAL ENVIRONMENTAL EFFECTS: The primary metabolites of bromacil are carbon dioxide, 5-bromo-6-methyluracil, 5-bromo-3-(alpha-hydroxymethylpropyl)-6-methyluracil, 5-bromo-3-sec-butyl-6-hydroxymethyluracil, 5-bromo-3-(2-hydroxy-1-methylpropyl)-6-methyluracil, and 3-sec-butyl-6-methyluracil. These metabolites are not of toxicological concern to EPA.

WATER:

SOLUBILITY: 700 mg/kg in water.

POTENTIAL FOR LEACHING INTO SURFACE AND GROUND WATER: Bromacil is persistent and highly mobile. Bromacil is known to leach into ground water and has high potential to enter surface waters.

AIR:

VOLATILIZATION: Very low.

POTENTIAL FOR BYPRODUCTS FROM BURNING OF TREATED VEGETATION: Not known.

IV. ECOLOGICAL TOXICITY EFFECTS ON NON-TARGET SPECIES

MICROORGANISMS:

ACUTE ORAL TOXICITY: LD₅₀ (honey bee 48-hour) >193.3 µg/bee

ACUTE CONTACT TOXICITY: LD₅₀ (honey bee 48-hour) >100 µg/bee

OVERALL TOXICITY: Practically Non-Toxic

PLANTS: Contact will injure or kill target and non-target brush/woody plants.

AQUATIC VERTEBRATES:

ACUTE TOXICITY: LC₅₀ (rainbow trout 96-hour) 36 mg/l

ACUTE TOXICITY: LC₅₀ (bluegill sunfish 96-hour) 127 mg/l

OVERALL TOXICITY: Slightly Toxic

AQUATIC FRESHWATER INVERTEBRATES:

ACUTE TOXICITY: EC₅₀ (*Daphnia magna* 48-hour) 121 mg/l

OVERALL TOXICITY: Practically Non-Toxic

AQUATIC ESTUARINE/MARINE INVERTEBRATES:

ACUTE TOXICITY: LC₅₀ (Eastern oyster larvae 48-hour) 130 mg/l

ACUTE TOXICITY: LC₅₀ (mysid 48-hour) 12.9 mg/l

ACUTE TOXICITY: LC₅₀ (sheepshead minnow 48-hour) 1620 mg/l

OVERALL TOXICITY: Practically Non-Toxic

TERRESTRIAL ANIMALS:

AVIAN ACUTE ORAL TOXICITY: LD₅₀ (bobwhite quail) >2250 mg/kg

MAMMAL ACUTE ORAL TOXICITY: LD₅₀ (rat) 3998 mg/kg

AVIAN SUBACUTE DIETARY TOXICITY: LC₅₀ (bobwhite quail) >10,000 mg/kg

AVIAN SUBACUTE DIETARY TOXICITY: LC₅₀ (mallard duck) >10,000 mg/kg

OVERALL TOXICITY: Practically Non-Toxic

BIOACCUMULATION POTENTIAL: Low potential

THREATENED AND ENDANGERED SPECIES: Federally listed plants may be adversely affected if the product is applied directly to the plants.

V. TOXICOLOGICAL DATA

ACUTE TOXICITY:

ACUTE ORAL TOXICITY: LD₅₀ (rat) 5126 mg/kg

ACUTE DERMAL TOXICITY: LD₅₀ (rabbit) >5000 mg/kg

PRIMARY SKIN IRRITATION: Rabbit - Not an Irritant

PRIMARY EYE IRRITATION: Rabbit – Slight Irritant

ACUTE INHALATION: LC₅₀ (rat) >14.4 mg/l

OVERALL TOXICITY: Category III – Caution

CHRONIC TOXICITY:

CARCINOGENICITY: Classified by EPA as Group C - possible human carcinogen.

DEVELOPMENTAL/REPRODUCTIVE: No effects reported.

MUTAGENICITY: Not a mutagenic.

HAZARD: The end-use product label for Hyvar™ carries the *Caution* signal word due to eye irritation, potential exposure to mixers/applicators, and PPE requirements.

VI. HUMAN HEALTH EFFECTS

ACUTE TOXICITY (POISONING):

REPORTED EFFECTS: Low Risk.

CHRONIC TOXICITY:

REPORTED EFFECTS: None reported.

POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM CONTACTING OR CONSUMING TREATED VEGETATION, WATER OR ANIMALS: None reported.

POTENTIAL FOR ADVERSE HEALTH EFFECTS FROM INERT INGREDIENTS CONTAINED IN THE FORMULATED PRODUCTS: Information not available.

HEALTH EFFECTS OF EXPOSURE TO FORMULATED PRODUCTS: Mild, temporary skin and eye irritation.

HEALTH EFFECTS ASSOCIATED WITH CONTAMINANTS: None reported.

HEALTH EFFECTS ASSOCIATED WITH OTHER FORMULATIONS: None reported.

VII. SAFETY PRECAUTIONS

SIGNAL WORD AND DEFINITION:

BROMACIL - **CAUTION** – HARMFUL IF SWALLOWED. CAUSES MODERATE EYE IRRITATION. AVOID CONTACT WITH EYES OR CLOTHING

PROTECTIVE PRECAUTIONS FOR WORKERS: Applicators and other handlers must wear long-sleeved shirt and long pants, shoes plus socks, and waterproof gloves.

MEDICAL TREATMENT PROCEDURES (ANTIDOTES):

EYES: Flush eyes with water; call physician if irritation persists.

SKIN: Wash all exposed areas with soap and water; call physician if irritation persists.

INGESTION: Induce vomiting and call physician or Poison Control Center.

INHALATION: None.

HANDLING, STORAGE AND DISPOSAL: Store at room temperature or cooler. Do not reuse container. Rinse container and dispose accordingly. Liquid formulation is combustible. Do not use or store near heat or open flame. Keep container closed when not in use.

EMERGENCY SPILL PROCEDURES AND HAZARDS: Contain and sweep up material of small spills and dispose as waste. Do not contaminate water, food or feed by storage or disposal.

VIII. DEFINITIONS

adsorption – the process of attaching to a surface

avian – of, or related to, birds

CAEPA – California Environmental Protection Agency

carcinogenicity – ability to cause cancer

CHEMTREC – Chemical Transportation Emergency Center

dermal – of, or related to, the skin

EC₅₀ - median effective concentration during a bioassay

ecotoxicological – related to the effects of environmental toxicants on populations of organisms originating, being produced, growing or living naturally in a particular region or environment

FIFRA – Federal Insecticide, Fungicide and Rodenticide Act

formulation – the form in which the pesticide is supplied by the manufacturer for use

half-life – the time required for half the amount of a substance to be reduced by natural processes

herbicide – a substance used to destroy plants or to slow down their growth

Hg – chemical symbol for mercury

IARC – International Agency for Research on Cancer

K(oc) – the tendency of a chemical to be adsorbed by soil, expressed as: $K(oc) = \text{conc. adsorbed}/\text{conc. dissolved}/\% \text{ organic carbon in soil}$

LC₅₀ – the concentration in air, water, or food that will kill approximately 50% of the subjects

LD₅₀ – the dose that will kill approximately 50% of the subjects

leach – to dissolve out by the action of water

mg/kg – weight ratio expressed as milligrams per kilogram

mg/l – weight-to-liquid ratio expressed as milligrams per liter

microorganisms – living things too small to be seen without a microscope

mPa – milli-Pascal (unit of pressure)

mutagenicity – ability to cause genetic changes

NFPA – National Fire Protection Association

NIOSH - National Institute for Occupational Safety and Health

NOEL - no observable effect level

non-target – animals or plants other than the ones that the pesticide is intended to kill or control

OSHA - Occupational Safety and Health Administration

Pa – Pascal (unit of pressure)

persistence – tendency of a pesticide to remain to remain in the environment after it is applied

pesticides – substances including herbicides, insecticides, rodenticides, fumigants, repellents, growth regulators, etc., regulated under FIFRA

PPE – personal protective equipment

ppm – weight ratio expressed as parts per million

residual activity – the remaining amount of activity as a pesticide

T&E – Threatened and Endangered Species (from the Endangered Species Act)

µg – micrograms

volatility – the tendency to become a vapor at standard temperatures and pressures

IX. INFORMATION SOURCES

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X. TOXICITY CATEGORY TABLES

TABLE I: HUMAN HAZARDS

Category	Signal Word	Route of Administration			Hazard	
		Acute Oral LD ₅₀ (mg/kg)	Acute Dermal LD ₅₀ (mg/kg)	Acute Inhalation LC ₅₀ (mg/l)	Eye irritation	Skin irritation
I (Highly Toxic)	DANGER (poison)	0-50	0-200	0-0.2	corrosive: corneal opacity not reversible within 7 days	corrosive
II (Moderately Toxic)	WARNING	>50-500	>200-2000	>0.2-2	corneal opacity reversible within 7 days; irritation persisting for 7 days	severe irritation at 72 hours
III (Slightly Toxic)	CAUTION	>500-5000	>2000-20,000	>2-20	no corneal opacity; irritation reversible within 7 days	moderate irritation at 72 hours
IV (Practically Non-toxic)	NONE	>5000	>20,000	>20	no irritation	moderate irritation at 72 hours

After *Pesticide User's Guide*, Ohio State University, Extension Bull. No. 745, 1998.

TABLE II: ECOTOXICOLOGICAL RISKS TO WILDLIFE (TERRESTRIAL AND AQUATIC)

Risk Category	Mammals	Avian	Avian	Fish or Aquatic Invertebrates
	Acute Oral LD ₅₀ (mg/kg)	Acute Oral LD ₅₀ (mg/kg)	Acute Dietary LC ₅₀ (mg/kg)	Acute Concentration LC ₅₀ (mg/l)
Very Highly Toxic	<10	<10	<50	<0.1
Highly Toxic	10-50	10-50	50-500	0.1 – 1
Moderately Toxic	51-500	51-500	501-1,000	>1 – 10
Slightly Toxic	501-2,000	501-2,000	1,001-5,000	>10 – 100
Practically Non-toxic	>2,000	>2,000	>5,000	>100

Table II created from information contained in *Pesticides and Wildlife*, Whitford, Fred, et al., Purdue University Cooperative Extension Service PPP-30, 1998.

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